

## 6-6

# Study Guide and Intervention

## Analyzing Graphs of Quadratic Functions

### Analyze Quadratic Functions

**Vertex Form  
of a Quadratic  
Function**

The graph of  $y = a(x - h)^2 + k$  has the following characteristics:

- Vertex:  $(h, k)$
- Axis of symmetry:  $x = h$
- Opens up if  $a > 0$
- Opens down if  $a < 0$
- Narrower than the graph of  $y = x^2$  if  $|a| > 1$
- Wider than the graph of  $y = x^2$  if  $|a| < 1$

**Example** Identify the vertex, axis of symmetry, and direction of opening of each graph.

a.  $y = 2(x + 4)^2 - 11$

The vertex is at  $(h, k)$  or  $(-4, -11)$ , and the axis of symmetry is  $x = -4$ . The graph opens up, and is narrower than the graph of  $y = x^2$ .

a.  $y = -\frac{1}{4}(x - 2)^2 + 10$

The vertex is at  $(h, k)$  or  $(2, 10)$ , and the axis of symmetry is  $x = 2$ . The graph opens down, and is wider than the graph of  $y = x^2$ .

**Exercises**

Each quadratic function is given in vertex form. Identify the vertex, axis of symmetry, and direction of opening of the graph. *A. State if the graph is skinnier or wider.*

1.  $y = (x - 2)^2 + 16$

2.  $y = 4(x + 3)^2 - 7$

3.  $y = \frac{1}{2}(x - 5)^2 + 3$

4.  $y = -7(x + 1)^2 - 9$

5.  $y = \frac{1}{5}(x - 4)^2 - 12$

6.  $y = 6(x + 6)^2 + 6$

7.  $y = \frac{2}{5}(x - 9)^2 + 12$

8.  $y = 8(x - 3)^2 - 2$

9.  $y = -3(x - 1)^2 - 2$

10.  $y = -\frac{5}{2}(x + 5)^2 + 12$

11.  $y = \frac{4}{3}(x - 7)^2 + 22$

12.  $y = 16(x - 4)^2 + 1$

13.  $y = 3(x - 1.2)^2 + 2.7$

14.  $y = -0.4(x - 0.6)^2 - 0.2$

15.  $y = 1.2(x + 0.8)^2 + 6.5$